chloric acid is equivalent to a 0.0003 M. concentration of hydrogen ion and so called "free acidity" is no longer present. The average pH value of the first specimens in which titratable free acid was determinable after the introduction of the amigen solution was 3.44, which approximates this theoretical value.

Any preparation which would control gastric acidity

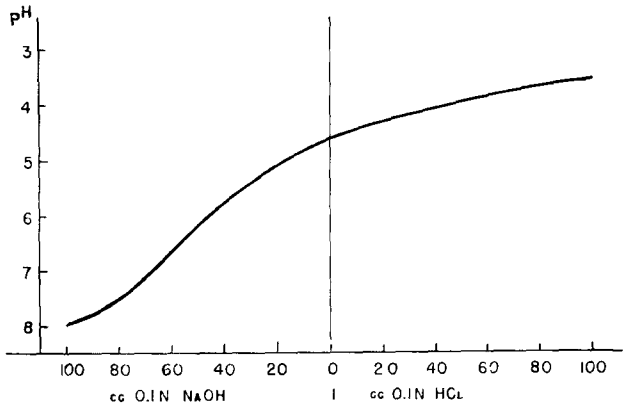

Fig. 3. Potentiometric titration curve demonstrating the buffering capacity of 100 cc. 10% amigen solution in distilled water. (Leeds and Northrup—Universal pH meter.)

is of practical importance in the management of peptic ulcer. It is recognized that uncontrolled gastric acidity plays a part in the production of an ulcer and interferes with its healing. Since it disappears from a solution at a pH of 3.5, free acid would no longer be a serious factor at this point or higher. The part played by pepsin must also be considered. Hollander (3) states that complete inactivation of pepsin is not obtained until the pH is elevated to 5.0 and that between 4.0 and 5.0 there is no more than 10% of the maximum proteolytic activity of pepsin remaining. Values within this range are readily obtained with the amigen solution (Fig. 2 and Chart II.) This would be expected because of the marked buffering capacity (Fig. 3) of the constituent amphoteric molecules.

This preparation is, in addition, a potential source of amino nitrogen for body metabolism (1.) It is of interest that none of the normal subjects who received this mixture experienced any untoward effects; in fact, there was not even the slightest discomfort. As a result of these observations, the use of amigen in the management of bleeding peptic ulcers is being investigated and will be reported upon in the near future.

CONCLUSIONS

1. An amino acids mixture (amigen) is an effective buffering agent when introduced into the stomach. The pH values as determined in 18 subjects are well within that range of pH in which free acid is not present and peptic activity is reduced to a minimum.
2. This mixture can be given safely to normal individuals without even the mildest discomforts.
3. It is suggested that amigen may be used in the clinical management of peptic ulcer, even in the presence of bleeding.

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The Use of Sulfaguanidine for Ulcerative Colitis*

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SINCE the introduction of the Sulfonamide drugs there has been a hope of finding one that would destroy or vitiate those organisms normally present in the bowel which, regardless of etiology, continue the infection in ulcerative colitis.

With this end in view, Bargen (1) and Collins (2) introduced the sulfa drugs in the treatment of ulcerative colitis. Sulfathiazole was the most efficacious and best tolerated of those I tried. After Lyon (3) suggested the possibilities of Sulfaguanidine for bacillary dysentery, I employed it for ulcerative colitis. The rarity of ulcerative colitis and the variation in its clinical manifestations made unsatisfactory the alternate case method of studying the drug, and its value in this disease could only be judged clinically. I hope to convey to the reader my impression that the drug has clinical value.

My observations confirm those of Firor and Poth (4) that despite the high concentrations of the drug which were obtained in the colon nothing approaching sterilization of the colon contents occurred. We were able to obtain positive stool cultures for streptococci and colon bacilli with a concentration of sulfaguanidine as high as .8 grams per 100 grams of stool. Firor and Poth using animals were able to grow colon bacilli from stools consisting almost entirely of sulfaguanidine.

I have used sulfaguanidine in sixteen cases that have been followed from six to sixteen months. In addition to using sulfaguanidine, a regimen previously described (5, 6) for treating ulcerative colitis, was followed. Although we were unable to sterilize the stools, in eleven of the cases results were excellent, in two cases questionable, in that the sulfaguanidine did not bring about prompt arrest of symptoms, but the colitis gradually was brought under control. In two cases no benefit of any kind was evident. In one case there was such marked suppression of leucocyte formation that the drug had to be discontinued, though the colitis was markedly benefited. In three cases mild, and in two cases severe, skin reactions occurred.

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One of these patients developed a generalized vesiculopustular eruption of the entire body. After a few months, when, during an exacerbation of the colitis, the drug was again given but in smaller dosage, no skin lesions were observed. The other patient with a severe reaction developed a maculo-papular rash and intense headache which disappeared on discontinuance of the drug, but reappeared within forty-eight hours on doses as small as one gram per day. It was noted that unless and until stool concentrations of about five hundred mgm. per 100 grams of stool were obtained, little benefit could be expected from the use of sulfaguanidine. Obviously the more frequent the movements the harder it was to get adequate stool concentrations. Adults were given from six to twelve grams of the drug a day for periods of several weeks. In no case was a blood level of more than 1.5 mgm. per cent obtained though urine levels of forty mgm, per cent were not unusual and crystals were frequently seen in the urine. The low blood levels are the result of rapid excretion in the urine rather than as was first thought, of poor absorption from the bowel (4). Blood smears were examined three times per week whenever sulfaguanidine was used.

Results obtained seem to me to justify a trial of sulfaguanidine for every case of ulcerative colitis. If it proves helpful it should be employed at the earliest sign of an exacerbation and also whenever the patient has an upper respiratory infection. The latter often initiate bouts of colitis. By observing simple precautionary measures, toxic manifestations can be recognized early, and use of the drug should be discontinued temporarily. Sulfaguanidine is non-specific and probably is valuable only because it cuts down on the secondary invaders in the colon giving the mucosa a chance at self restoration.

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Editorials

HOW VITAMINS AFFECT THE BODY'S METABOLISM

THE University of Chicago Press has recently published a fine report of a symposium on the biological action of the vitamins.* This little volume will interest every thoughtful physician who would like to get an idea of what is known today of the way in which the vitamins work, that is, what chemical functions they facilitate. As Dr. Elvehjem pointed out in the first paper, everyone is now willing to admit that many of the deficiency diseases in both men and animals are due to a lack of *several* vitamins. As yet little is known about the action of Vitamin A. Little is known also of how Vitamin D affects calcification. Vitamin C appears to have much to do with the formation of the intercellular tissues. Vitamin E has much to do with the function of the pituitary gland.

Very interesting are the discoveries which have shown something of the relationship between the vitamins, the hormones, and the ferments and coferments. This series of papers brings out the fact that one of the best and simplest ways of studying vitamins is to see how they facilitate the growth of bacteria and yeast. Most physicians think of Vitamin B_1 as concerned primarily with the healing of nervous tissue, and the newspapers would have us believe that it is the "Morale vitamin." Actually, it can be shown to have marked influence on the growth of microscopic bacteria which have no nervous system at all, and which probably are not concerned about morale or the War in Europe.

Very interesting is the way in which some of the vitamins act as prosthetic groups for enzymes. Lack of Vitamin A causes a pronounced fall in the esterase content of the blood serum. Vitamin C affects the function of many proteolytic and oxidizing enzymes and it plays a rôle in the metabolism of plants. Nicotinic acid appears to function as a precursor of several co-enzymes.

Diphosphothiamine is a catalyst for the oxidation of pyruvic acid, and thus it helps in the metabolism of carbohydrate much as insulin does. All of which suggests that perhaps chemists will some day discover a substance that will take the place of insulin. Recent studies indicate that thiamine is necessary for the synthesis of fatty acids from carbohydrate, and this action is probably secondary to its effect on the oxidation of pyruvic acid. Thiamine helps in the synthesis of acetylcholine.

Helpful to the clinician may be the statement of Jolliffe that the addition of thiamine to an experimental diet, which in volunteers had produced a neurasthenic syndrome, caused all symptoms to disappear *within three days*. This would suggest that when a patient, stuffed for weeks with thiamine, fails to show any pronounced improvement, the probability is that his symptoms are not due to a deficient diet.

Interesting is the discovery that the measurement of the amount of pyruvic acid in the blood is a good test for thiamine deficiency. From this it is to be hoped that some day, instead of stuffing all our patients with vitamins, we will do a few tests on the urine or blood to see whether they really need this medication. Certainly the practice of medicine will then become more scientific.

Of interest to clinicians is the discussion by Dr. Sebrell of riboflavin deficiencies. The symptom most likely to be noticed is the appearance of linear fissures at the angles of the mouth. In bad cases there is a vascularized keratitis with photophobia. It is remarkable that this type of deficiency is not seen more often because the amount of riboflavin to be found in most common foods is very small. The best sources of

*The Biological Action of the Vitamins. A symposium edited by E. A. Evans, Jr., Univ. Chicago Press, Chicago, $3.00.